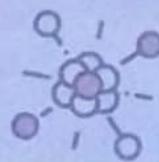
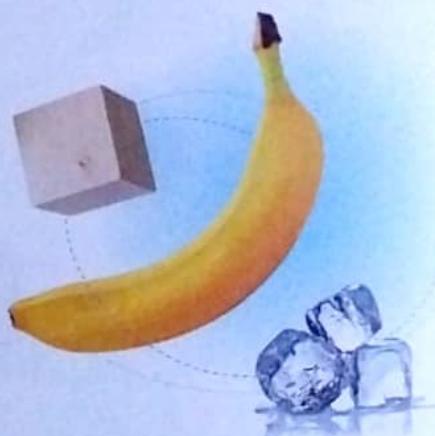


Matter and its Characteristics



What is meant by matter ?

- Everything around us on the Earth's surface is called **Matter**.
- Any matter has a mass and a volume.



Matter

It is anything that has a **mass & a volume**.

or

It is anything that has a **mass and occupies a space**.

Mass

It is the amount of matter that the body contains.



The measuring unit of mass is **gm or kg**.

Volume

It is the space that is occupied by the body.



The measuring unit of volume is **cm³, m³ or L**.



Properties of matter

- Matter can be distinguished from each other by :

First : Physical properties.

Second : Chemical properties.

FIRST

Physical properties

- Physical properties of matter are :



1 The colour, taste & smell

Some materials can be distinguished by colour, taste or smell, for example :

We can differentiate between

Iron, silver and gold



Silver



Gold

by

Colour

Sugar, table salt and flour



Sugar



Table salt

by

Taste

Vinegar and perfume



Vinegar



Perfume

by

Smell

 **Note**

Some substances have no colour, no taste and no smell

such as: • water • oxygen gas

but they differ from each other in other properties.



Warning: Don't taste or smell any substance in the lab. without asking your teacher first **G.R.**

Because some substances may harm you.

Question

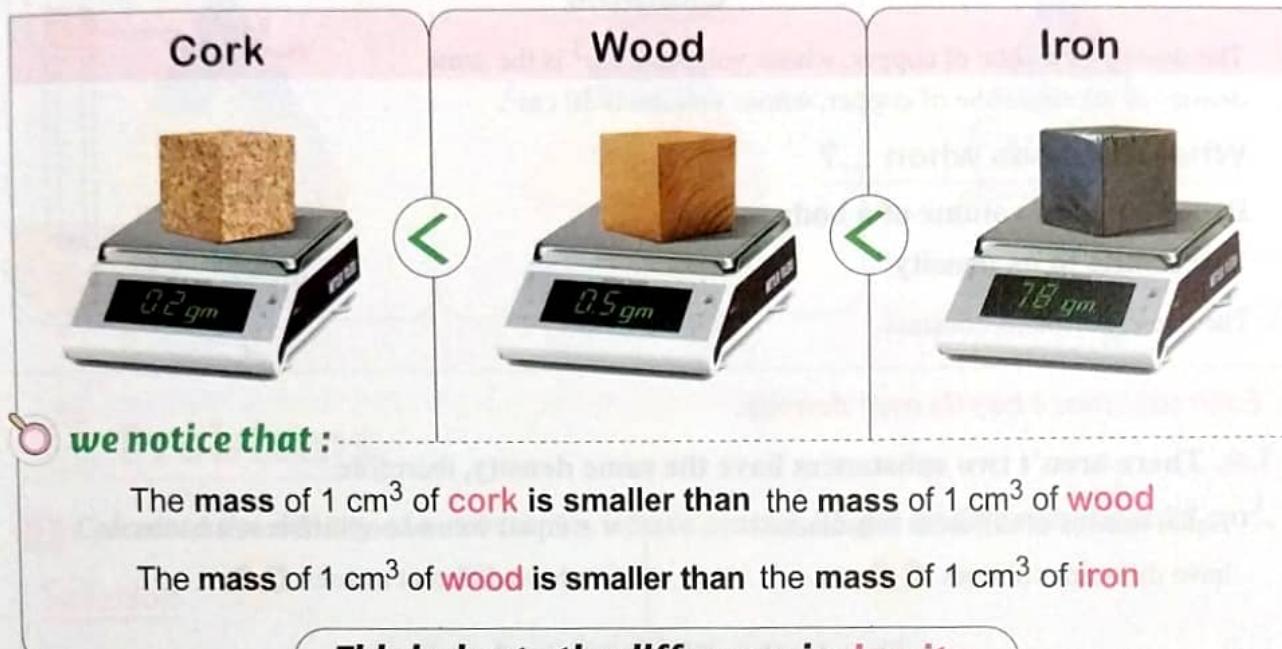
Complete :

1. The taste property is the distinguishing factor between and
2. You can distinguish between gold and silver by their different



2 Density

Look at the following figures that show the mass of equal volumes of different substances :



Density

It is the mass of unit volume of a substance.
or
It is the mass of one cubic centimetre of a substance.

The measuring unit of density is gm/cm^3 .

$$\text{Density (D)} = \frac{\text{Mass (M in gm)}}{\text{Volume (V in cm}^3)}$$

What is meant by ...?

The density of water is 1 gm/cm^3 .

⇒ This means that the mass of 1 cm^3 of water equals 1 gm.

Question

Complete :

1. The density is the of unit volume of a substance and its measuring unit is
2. Density =

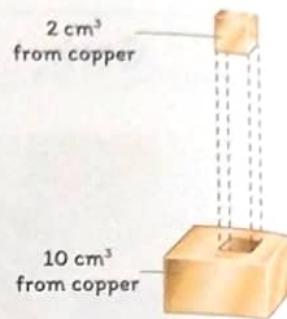


Notes

- The density of a matter is a fixed value, whatever the used volumes or masses differ.

Example

The density of a cube of copper, whose volume 2 cm^3 is the same density of another cube of copper, whose volume is 10 cm^3 .



What happens when ...?

Decreasing the volume of a body to half "according to its density".

The density remains constant.

- Each substance has its own density.

i.e. There aren't two substances have the same density, therefore

• Equal masses of different substances have different volumes **G.R.**

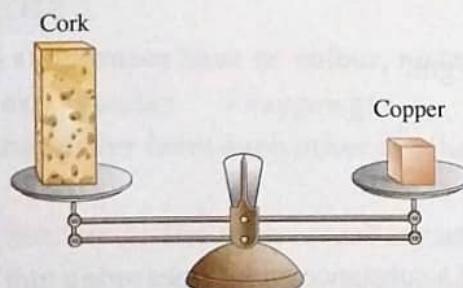
• Equal volumes of different substances have different masses **G.R.**

Due to the difference in density.

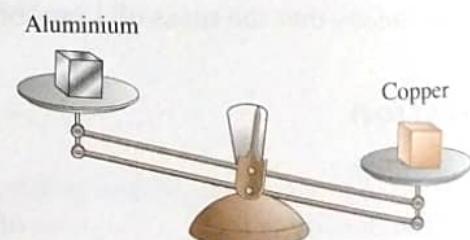
Example

From the following two tables

Substance	Copper	Cork
Mass (gm)	10	10
Volume (cm ³)	1.136	50



Substance	Copper	Aluminium
Mass (gm)	8.8	2.7
Volume (cm ³)	1	1



We observe that

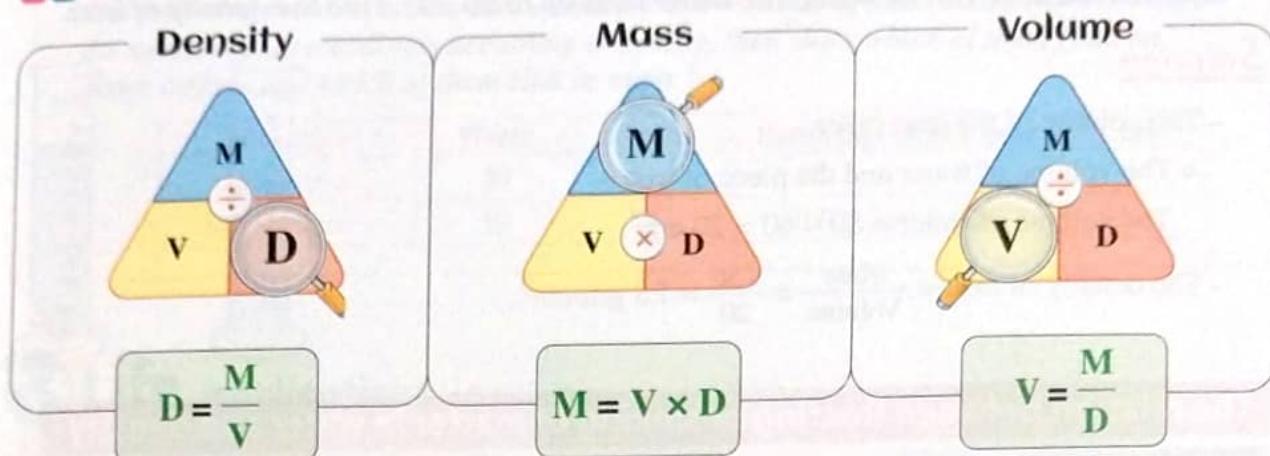
The volume of copper cube is **smaller** than the volume of cork cube, although they have the same mass **G.R.**

The mass of copper cube is **larger** than the mass of aluminium cube, although they have the same volume **G.R.**

Due to the difference in density.



 To calculate the Density, Mass and Volume :



Problems

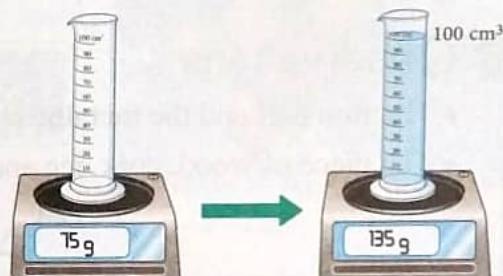
1 Calculate the density of a substance, whose mass is 35 gm and its volume is 25 cm^3 .

Solution

$$\text{Density (D)} = \frac{\text{Mass (M)}}{\text{Volume (V)}} = \frac{35}{25} = 1.4 \text{ gm/cm}^3.$$

2 In an experiment for determining the density of a liquid, the following results are recorded :

- The mass of an empty cylinder = 75 gm.
- The mass of the cylinder containing liquid = 135 gm.
- The volume of the liquid = 100 cm^3 .
- Calculate the density of the liquid.



Solution

- The mass of the liquid
- = The mass of the cylinder containing liquid – The mass of the empty cylinder
- = $135 - 75 = 60 \text{ gm}$.
- The density of the liquid = $\frac{\text{Mass}}{\text{Volume}} = \frac{60}{100} = 0.6 \text{ gm/cm}^3$.

NB

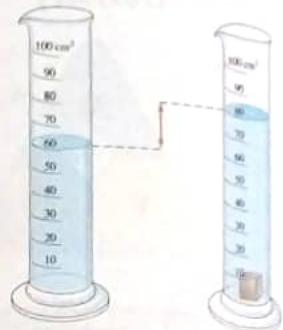
When a solid body submerged in a known volume of water, the amount of increase in the volume of water is equal to the volume of the solid body.

The volume of a solid body \equiv Volume of water and solid body – Volume of water

3 On determining iron density using a piece of iron whose mass is 156 gm, the iron piece is immersed in 60 cm^3 of water, the water rises up to 80 cm^3 . Find the density of iron.

Solution

- The volume of the iron piece
- = The volume of water and the piece of iron –
- The volume of water = $80 - 60 = 20 \text{ cm}^3$.
- The density of iron = $\frac{\text{Mass}}{\text{Volume}} = \frac{156}{20} = 7.8 \text{ gm/cm}^3$.



The relation between floating or sinking of matter in water and density

The matter of low density floats on that of high density as shown in the following activity.

Activity

1 • To compare between the density of some substances and the density of water :

Step:

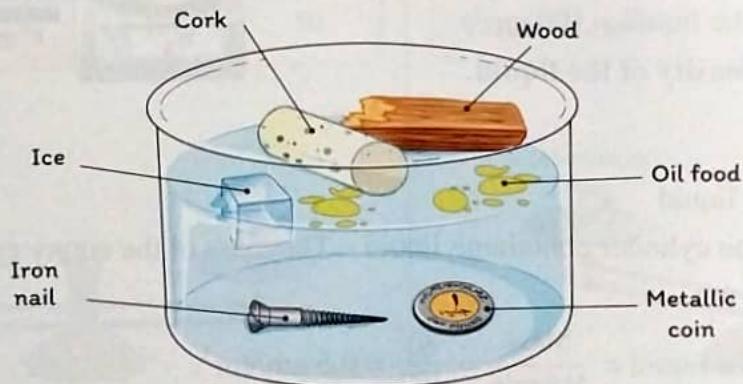
Put the following substances in a basin containing water.

- A piece of wood.
- An iron nail.
- A piece of ice cube.
- Drops of oil food.
- A piece of cork.
- A metallic coin.



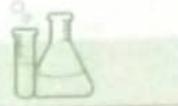
Observations:

- The iron nail and the metallic coin sink in water.
- The piece of wood, cork, ice and the drops of oil float on water surface.



Conclusions:

- Materials which have **higher density** than water **sink** in it such as an iron nail and a metallic coin.
- Materials which have **lower density** than water **float** on its surface such as wood, cork, ice and drops of oil.



Question

The following table records values of masses and volumes of some substances. Arrange the substances descendingly according to density, then show which of them float on water surface and which of them sink in water?

Substance	Water	Iron	Petrol oil	Red copper	Cork
Mass (gm)	50	31.2	82	22	5
Volume (cm ³)	50	4	100	2.5	25



Life applications of density

1 Water is not used to put out (extinguish) petrol fires G.R.

Because the density of petrol is less than that of water so, petrol floats on water surface and water doesn't put out the petrol fires.



2 Balloons filled with hydrogen or helium rise up in the air carrying flags during festivals G.R.

Because the densities of hydrogen and helium are less than the density of air.



3 The change in the density of matter is used to check the purity of matter G.R.

Because each matter has its own density therefore the change in the density value of any substance indicates its impurity.



Example :

Determination of the quality of natural milk knowing that the density of milk is 1.03 gm/cm^3 that by determination of the volume and the mass of milk then calculate its density, if the density of milk differs from 1.03 gm/cm^3 the milk is impure (doped).

TRY to answer worksheet in the Notebook

1

3 Melting point

- Matter exists in three states which are solid, liquid and gaseous.
- The change of matter from solid state to liquid state by heating is known as **Melting**.
- The temperature at which the matter begins to melt is called **Melting point**.



Melting point

It is the temperature at which matter begins to change from a solid state to a liquid state.

What is meant by ...?

The melting point of ice = 0°C .

⇒ This means that ice begins to change into water at 0°C .

* *Each solid substance has a definite melting point which is used to differentiate between different substances.*

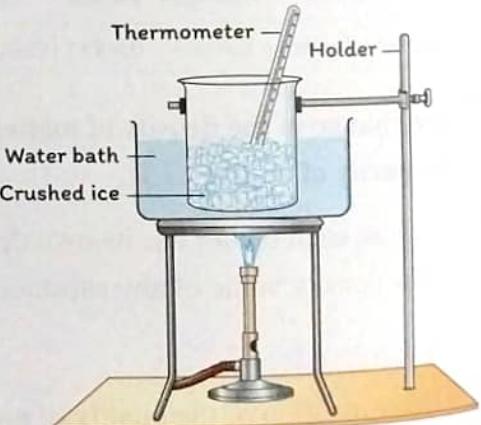
Activity

(2)

• To differentiate between different substances by the point of fusion (melting point) :

Steps:

1. Put a beaker containing crushed ice and a thermometer in a water bath.
2. Put the water bath on a flame for a period of time.
3. When the ice starts to melt, remove the flame and record the thermometer reading.
4. Replace the crushed ice by wax and repeat the previous steps.



Observation:

The melting point of ice is less than that of wax.

Conclusion:

Each substance has a definite melting point.



- Substances can be classified according to **melting points** into :

Substances have **low** melting points

Such as :

- Wax.
- Butter.
- Ice.



Substances have **high** melting points

Such as :

- Iron.
- Copper.
- Aluminium.
- Table salt.



Life applications of melting point :

- 1 Cooking pans (pots) are made up of aluminium or stainless steel alloy which don't rust **G.R.**

Due to their high melting point.



- 2 Workmen melt the solid metals **G.R.**

To be easy for mixing and shaping to form alloys as :

- **Copper-gold alloy** that is used in making jewels.



- **Nickel-chrome alloy** that is used in making heating coils.



4 Boiling point

- The change of matter from liquid state to gaseous state by heating is known as **Boiling**.
- The temperature at which the matter begins to boil is called **Boiling point**.

**Boiling point**

It is the temperature at which matter begins to change from a liquid state to a gaseous state.

What is meant by ...?

The boiling point of water = 100°C.

⇒ This means that water begins to change into water vapour at 100°C.

* *Each liquid substance has a definite boiling point which is used to differentiate between different substances.*

**Life application of boiling point :**

The separation of the components of crude petroleum oil by heating **G.R.**

Due to the difference between them in their boiling points.

Question**Who Am I :**

1. Substance that has a high melting point. (.....)
2. Alloy that is used in making jewels. (.....)

Choose :

1. Solid substance whose melting point is 1500 °C, starts to change into liquid at °C.

a. 1000	b. 1500	c. 1550	d. 2000
---------	---------	---------	---------
2. Stainless steel is a type of

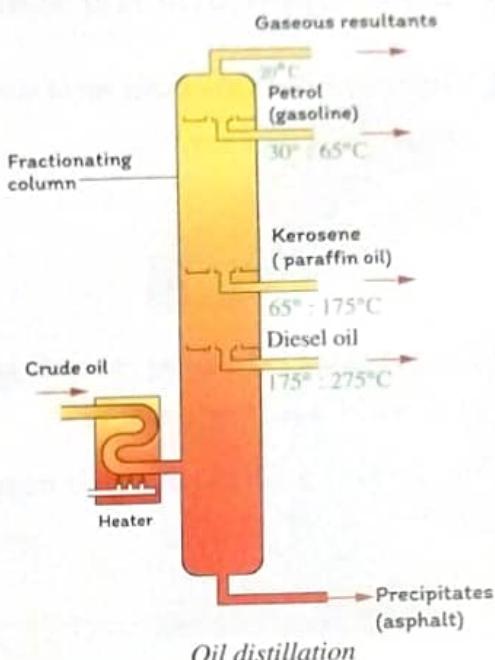
a. alloys.	b. salts.	c. plastic.	d. acids.
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► Enrichment information

* **The separation of the components of crude oil**

can be done by heating the crude oil, then separating each substance at its boiling point.



* **Boiling point** is the temperature at which the vapour pressure of the substance is equal to the atmospheric pressure, so when pressure increases, the boiling point increases.

* **Pressure pans** are used for fast cooking as they raise the pressure so, boiling point increases and food is cooked faster.



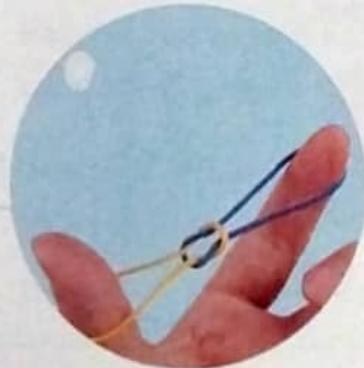
Pressure pan

5 Hardness

• Solid substances are divided according to hardness into :

Solid substances are soft at room ordinary temperature

as Rubber



Solid substances become soft by heating to be shaped easily

as Metals



Solid substances can't be soften by heating

as Coal and Sulphur




Life applications of hardness :

1 The screwdrivers are made up of steel iron **G.R.**

Because it is very hard.



2 The rods used in building concrete houses are made up of iron not copper **G.R.**

Because the hardness of iron is more than that of copper.



TRY to answer worksheet
in the Notebook

2

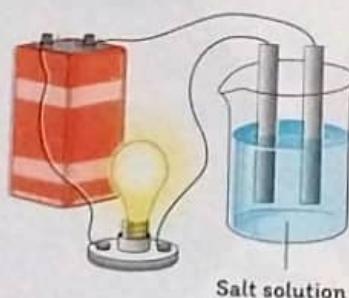
6 Electric conduction

- Substances can be classified according to electric conduction into :

Good conductors of electricity

Substances *allow* electricity to flow through.

- Metals as :**
Iron, silver, copper, aluminium,
- Some solutions as :**
Acidic solutions, alkaline solutions and some salt solutions.

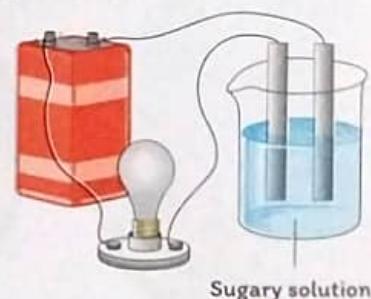


Bad conductors of electricity

Substances *don't allow* electricity to flow through.

Examples

- Gases.**
- Some solid substances as :**
Sulphur, phosphorus, wood and plastic.
- Some solutions as :**
 - Solution of hydrogen chloride in benzene.
 - Sugary solution.





Life applications of electric conduction :

1 Electric wires (or cables) are made up of copper or aluminium and covered with a plastic layer **G.R.**

Because both of copper and aluminium are good conductors of electricity, while plastic is a bad conductor of electricity.



2 Electric screwdrivers are made up of steel iron, while their handles are made up of wood or plastic **G.R.**

Because steel iron is a good conductor of electricity, but wood and plastic are bad conductors of electricity.



7 Thermal conduction

- Substances can be classified according to thermal conduction into :

Good conductors of heat

Substances *allow heat to flow through.*

Bad conductors of heat

Substances *don't allow heat to flow through.*

Examples

Metals such as iron, copper, aluminium,

Wood and plastic.

Life applications of thermal conduction :

1 Cooking pans are made up of aluminium **G.R.**

Because aluminium is a good conductor of heat and it has a high melting point.



2 Handles of cooking pans are made up of wood or plastic **G.R.**

Because wood and plastic are bad conductors of heat.

Question

Choose from column (B) & (C) what suit them in column (A) :

(A)	(B)	(C)
1. Copper	a. is hard to be shaped	A. because it is bad conductor of heat.
2. Rubber	b. is used in making handles of cooking pans	B. because it is good conductor of electricity.
3. Sulphur	c. is used in making heating coils	C. because its hardness is low.
4. Wood	d. is used in making electric wires	D. because it is bad conductor of electricity.
	e. is soft at room ordinary temperature	E. because it can't be soften by heating.

SECOND**Chemical properties****Metals and chemical activity**

Metals can be classified according to their chemical activity into three groups :

A Very active metals:

They are metals which react with oxygen when they are exposed to humid air, so they lose their metallic luster.

⦿ **Examples :** Sodium and potassium.

**Life application of chemical activity :**

Sodium and potassium are kept under kerosene surface **G.R.**

To prevent their reaction with atmospheric oxygen.



Keeping sodium under kerosene

B Less active metals:

They are metals which react with oxygen if they are left in air for some days forming a layer of rust.

⦿ **Examples :** Iron, aluminium and copper.



Life applications of chemical activity :

1 Steel bridges and the holders of light bulbs are painted from time to time **G.R.**

To protect them from rust and corrosion.



2 Metallic spare parts of cars are covered with grease **G.R.**

To protect them from rust and corrosion.



3 Aluminium cooking pans are washed with a rough material **G.R.**

To remove the rust layer formed on their surfaces.



C Inactive metals :

They are metals which find great difficulty in reacting with oxygen.

⇒ **Examples :** Silver, platinum, nickel, gold and chromium.

Life applications of chemical activity :

1 Silver, gold and platinum are used in making jewels **G.R.**

Because they are chemically poor active so, they keep their luster for long time.



2 Nickel, gold and silver are used to cover other substances which rapidly gain rust such as iron **G.R.**

To protect them from rust and corrosion.



TRY to answer
worksheet
in the Notebook

3

Remember



Lesson One

⦿ Matter :

- It is anything that has a mass and a volume (occupies a space).

⦿ Mass :

- It is the amount of matter that the body contains.
- Its measuring unit is **gm**.

⦿ Volume :

- It is the space that is occupied by the body.
- Its measuring unit is **cm³**.

Properties of matter

A Physical properties

1. The colour, taste and smell.

- They are properties that can sometimes be used to differentiate between different materials.

2. Density :

- It is the mass of unit volume of a substance.

Or

- It is the mass of one cubic centimetre of a substance.
- Its measuring unit is **gm/cm³**.

$$\text{Density (D)} = \frac{\text{Mass (M)}}{\text{Volume (V)}}$$

3. Melting point :

- It is the temperature at which matter begins to change from a solid state to a liquid state.

4. Boiling point :

- It is the temperature at which matter begins to change from a liquid state to a gaseous state.

5. Hardness :

Solid substances are divided according to hardness into :

Solid substances are **soft** at room ordinary temperature as **Rubber**.

Solid substances **become soft** by heating to be shaped easily as **Metals**.

Solid substances can't be **soften** by heating as **Coal** and **Sulphur**.



6. Electric conduction :

- **Good conductors of electricity :**

Ex.: Metals as iron, silver, copper, aluminium and some solutions as acidic solutions, alkaline solutions and some salt solutions.

- **Bad conductors of electricity :**

Ex.: Gases, some solid substances as sulphur, phosphorus, wood and plastic, and some solutions as solution of hydrogen chloride in benzene and sugary solution.

7. Thermal conduction :

- **Good conductors of heat :**

Ex.: Metals such as iron, copper, aluminium,

- **Bad conductors of heat :**

Ex.: Wood and plastic.

B

Chemical properties

Metals can be classified according to their chemical activity into three groups :

1 Very active metals

They are metals which react with oxygen when they are exposed to humid air, so they lose their metallic luster.

Examples :

- Sodium & potassium.

2 Less active metals

They are metals which react with oxygen if they are left in air for some days forming a layer of rust.

Examples :

- Iron, aluminium & copper.

3 Inactive metals

They are metals which find great difficulty in reacting with oxygen.

Examples :

- Silver, gold, platinum, nickel & chromium.

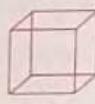
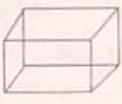
Questions ? on lesson One

• Remember • Understand • Apply • Higher skills • School book questions.



Interactive Exercises

1. Choose the correct answer :

- 1. The colour property is a distinguishing factor between
a. table salt and flour. b. iron and gold.
c. oxygen and nitrogen. d. oxygen and carbon dioxide.
- 2. The taste property is a distinguishing factor between
a. milk and honey. b. wood and plastic.
c. silver and gold. d. oxygen and nitrogen.
- 3. The smell property is a distinguishing factor between
a. iron and copper. b. vinegar and perfume.
c. wood and plastic. d. silver and iron.
- 4. The density of a substance is a property.
a. chemical b. physical
c. biological d. magnetic
- 5. Density of matter =
a. $\frac{\text{Volume}}{\text{Mass}}$ b. $\frac{\text{Mass}}{\text{Volume}}$ c. $\text{Mass} \times \text{Volume}$ d. $\text{Mass} + \text{Volume}$
- 6. Density of red copper is 8.8 gm/cm^3 means
a. the mass of the unit volume of red copper equals 8.8 gm .
b. the mass of the unit volume of red copper does not equal 8.8 gm .
c. the mass of 10 cm^3 of red copper equals 8.8 gm .
d. the mass of the unit volume of red copper equals 0.8 gm .
- 7. The volume of liquid is calculated from the relation
a. $\frac{\text{mass}}{\text{density}}$ b. $\frac{\text{density}}{\text{mass}}$
c. $\text{mass} \times \text{density}$ d. $\text{density} + \text{mass}$
- 8. The mass of water in gm is always its volume in cm^3 (Knowing that the density of water is 1 gm/cm^3).
a. double b. less than c. more than d. equal to
- 9. The following cubes have the same mass. Which one has the highest density ?
a. 
b. 
c. 
d. 



10. The density of a substance whose mass is 15 gm and occupies 30 cm^3 is the density of water.

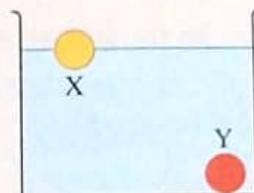
a. less than b. more than c. equal to d. double

11. Equal masses of different substances have volumes.

a. similar b. different c. constant d. equal

12. In the opposite figure, if the volumes of the two balls (X) and (Y) are equal, so the mass of ball (X) is the mass of ball (Y).

a. less than b. equal to c. more than d. double



13. is from the substances that float on water surface.

a. Iron b. Copper c. Cork d. Aluminium

14. When a substance sinks in water, this means that its density is the density of water.

a. equal to b. less than c. more than d. half

15. A piece of metal, whose mass is 25 gm and its volume is 10 cm^3 . When it is placed in water it will (Water density 1 gm/cm^3).

a. float. b. sink. c. suspend. d. dissolve.

16. The mass of a piece of rock whose density is 2.8 gm/cm^3 is 28 gm, so the density of 280 gm of it is gm/cm^3 .

a. 280 b. 28 c. 2.8 d. 28.5

17. The density of petroleum oil is that of water.

a. less than b. more than c. equal to d. double

18. The balloons that are filled with helium gas in celebrations, rise up in air, because

a. density of helium is more than that of air.
b. density of helium equals that of air.
c. density of helium is less than that of air.
d. density of helium is double that of air.

19. gas is used in filling balloons of celebrations.

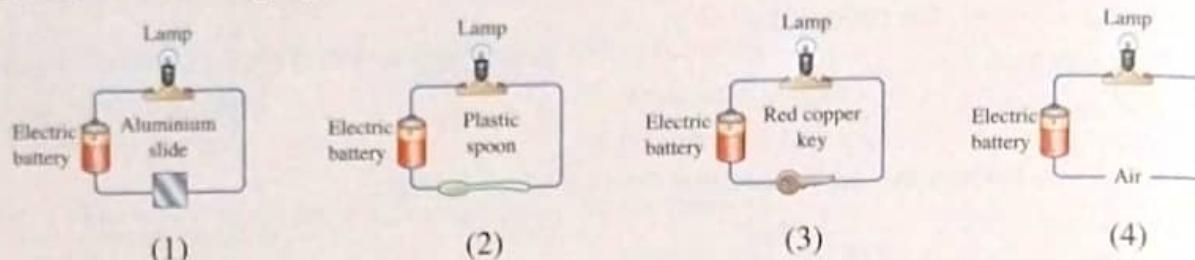
a. Oxygen b. Nitrogen c. Neon d. Hydrogen

20. Heating coils are made up of alloy.

a. iron-copper b. nickel-iron
c. nickel-chrome d. chrome-copper

- 21. Cooking pans are made up of
a. iron. b. aluminium. c. wood. d. plastic.
- 22. The solid substance whose melting point is 1500°C , starts to change into liquid at $^{\circ}\text{C}$.
a. 1000 b. 1500 c. 1550 d. 2000

23. In the following figures :



The lamp is illuminated in case(s) only.

- a. (1) & (3) b. (2) c. (2) & (4) d. (4)
- 24. The property of electric conduction is a distinguishing factor between
 - a. iron and copper.
 - b. wood and plastic.
 - c. iron and wood.
 - d. iron and aluminium.
- 25. All of the following substances conduct electricity except
 - a. iron.
 - b. aluminium.
 - c. wood.
 - d. copper.
- 26. Metals have all the following properties except they
 - a. are good conductors of electricity.
 - b. are good conductors of heat.
 - c. have a high melting point.
 - d. are bad conductors of electricity.
- 27. All of the following substances are good conductors of heat except
 - a. iron.
 - b. copper.
 - c. wood.
 - d. aluminium.
- 28. All of the following solutions conduct electricity except solution.
 - a. salt
 - b. acidic
 - c. alkaline
 - d. sugary
- 29. Among elements which have a great difficulty to react with oxygen of air is
 - a. potassium.
 - b. sodium.
 - c. aluminium.
 - d. chromium.
- 30. The metal used to cover other substances which rapidly rust is
 - a. silver.
 - b. copper.
 - c. lead.
 - d. iron.



2. Choose from column (B) & (C) what suit them in column (A) :

(A)	(B)	(C)
Substance	Importance	Scientific reason
1. Helium	a. used in making jewels	A. as it is a bad conductor of electricity.
2. Aluminium	b. used in making handles of screwdrivers	B. as its density is less than the density of air.
3. Platinum	c. used in making heating coils	C. as its melting point is high.
4. Plastic	d. used in filling balloons during festivals	D. as it is chemically poor active.
	e. used in making cooking pans	E. as it is a good conductor of electricity.

3. Put (✓) in front of the right statement and (✗) in front of the wrong one and correct it :

- 1. Taste property is used to differentiate between sugar and table salt. ()
- 2. Smell property is a distinguishing factor between a perfume and ammonia. ()
- 3. Density = Mass \times Volume. ()
- 4. The measuring unit of volume is cm^3 . ()
- 5. The measuring unit of density is cm^3/gm . ()
- 6. Ice and cork float on water surface, while iron and glass sink in water. ()
- 7. Wood floats on water surface as it has higher density than that of water. ()
- 8. Equal masses of different substances have the same volumes. ()
- 9. The density of hydrogen is higher than that of air. ()
- 10. Melting point is the temperature at which the matter begins to change from a solid phase into a liquid one. ()
- 11. Melting point and boiling point are from the physical properties of matter. ()
- 12. Each substance has a definite melting point and a definite boiling point. ()
- 13. Cooking pans are made up of aluminium as it has a low melting point. ()
- 14. The melting point of wax is equal to the melting point of table salt. ()
- 15. Heating coils are made up of nickel-chrome alloy. ()
- 16. Cooking pans are made up of aluminium and stainless steel. ()
- 17. Iron is soft, while rubber is hard at room temperature. ()
- 18. Electric cables are made up of copper and aluminium. ()
- 19. Wood and plastic are bad conductors of heat. ()
- 20. When potassium is exposed to air, it rusts after several days. ()
- 21. Iron rusts when it is exposed to dry air. ()
- 22. Silver, platinum and gold are inactive metals. ()

4. Write the scientific term of each of the following :

- 1. Anything that has a mass and a volume.
- 2. The mass of unit volume of the substance.
- 3. The amount of matter that the body contains.
- 4. The space occupied by a substance.
- 5. The measuring unit of density.
- 6. The temperature at which a substance begins to change from the solid state to the liquid state.
- 7. The temperature at which a substance begins to change from the liquid state to the gaseous state.
- 8. Metals react with atmospheric oxygen when they are exposed to humid air.
- 9. Metals react with atmospheric oxygen after a long time.
- 10. Metals which find a great difficulty to react with atmospheric oxygen when they are exposed to humid air.

5. Complete the following statements :

- 1. Matter is anything that has and
- 2. You can distinguish between gold and silver by their different
- 3. You can differentiate between table salt and sugar by their different
- 4. To determine the density of a body, you must know and
- 5. The measuring unit of mass is , while is the measuring unit of volume.
- 6. The density is the of unit volume of a substance and its measuring unit is
- 7. The mass of one cubic centimetre of matter is known as
- 8. A piece of lead of mass 114 gm occupies 10 cm^3 , its density is
- 9. and can sink in water as they have density than that of water.
- 10. The melting point is the temperature at which matter begins to change from a state into a state.
- 11. is the temperature at which the liquid begins to change into gas.
- 12. and are from the substances which have low melting points, while and are from the substances which have high melting points.
- 13. An alloy of is used in making jewels, while an alloy of is used in making heating coils.
- 14. is one of the solid substances which appear soft at room temperature, while and don't become soft by heating.
- 15. and are good conductors of electricity and heat, while and are bad conductors of electricity and heat.



- 16. Some solutions are good conductors of electricity as and , while others are bad conductors of electricity as
- 17. Electric wires are made up of or as they are conductors of electricity.
- 18. Electric screwdrivers are made up of , while their handles are made up of or
- 19., aluminium and are from elements that react with atmospheric oxygen after a long time.
- 20. Active metals lose their when they are exposed to air.
- 21. and are very active metals, while and are inactive metals.
- 22. Light posts in streets are painted from time to time to be protected from

6. Give reasons for the following :

1. Air is considered as matter.
2. Colour, taste and odour can't be used to differentiate between water and oxygen gas.
3. The mass of 1 cm^3 of iron is higher than that of 1 cm^3 of wood.
4. • Equal volumes of different substances have different masses.
• Equal masses of different substances have different volumes.
5. A piece of wood floats on water surface, while a piece of lead sinks in it.
6. An iron nail sinks in water, while one kilogram of cork floats on its surface.
7. Ice floats on water, although they are different states of the same matter.
8. Water isn't used to put off petrol fires.
9. Balloons filled with hydrogen or helium rise up in the air carrying flags during festivals.
10. A piece of ice changes into water after a period of time when it is left in air.
11. Workmen melt the solid metals.
12. It's easy to shape metals, while it's difficult to shape coal.
13. Iron rods not copper rods are used in building concrete houses.
14. Electric wires (or cables) are made up of copper or aluminium and they are covered by a plastic layer.
15. An electrician uses a screwdriver made up of steel iron with a plastic handle.
16. Cooking pans are made up of aluminium or stainless steel alloy which doesn't rust.
17. Handles of cooking pans are made up of wood or plastic.
18. Active metals such as sodium lose their metallic luster when they are exposed to moist air.
19. Potassium and sodium are kept under kerosene surface.

20. • Steel bridges and holders of light bulbs are painted from time to time.
 - Metallic spare parts of cars are covered with grease.
 - Some metallic pitchers are covered with a layer of silver.
21. Cooking pans made up of aluminium are washed with a rough material.
22. Gold, silver and platinum are used in making jewels.

7. Mention an example of each of the following :

1. A gas, whose density is lower than that of air.
2. A substance that has a low melting point.
3. A substance that has a high melting point.
4. An alloy that is used in making jewels.
5. An alloy that is used in making heating coils.
6. An alloy that is used in making cooking pans.
7. A solid substance which is soft at room temperature.
8. A solid substance which doesn't become soft by heating.
9. A substance, whose solution in benzene doesn't conduct electricity.
10. A substance that doesn't conduct electricity.
11. A good conductor matter for heat and electricity.
12. A substance which doesn't conduct electricity and heat.
13. A very active metal.
14. A metal reacts with oxygen as soon as being exposed to humid air.
15. A substance that is used to plate other metals.
16. A substance that is used to cover metallic spare parts of cars.

8. What is meant by ... ?

1. Matter.	2. Volume.
3. Mass.	4. The mass of an object equals 4 gm.
5. The mass of 1 cm^3 of aluminium is 2.7 gm.	
6. The mass of unit volume of water 1 gm.	7. Density.
8. The density of iron is 7.8 gm/cm^3	9. The density of water is 1 gm/cm^3
10. The density of aluminium equals 2.7 gm/cm^3	
11. Melting point.	12. The melting point of ice = 0°C .
13. Boiling point.	14. The boiling point of water = 100°C .



9. Mention one life application of each of the following :

1. Density.
2. Melting point.
3. Boiling point.
4. Hardness.
5. Electric conduction of matter.
6. Thermal conduction of matter.
7. Chemical activity.

10. Mention one importance (use) of each of the following :

1. Helium gas.
2. Copper-gold alloy.
3. Stainless steel alloy.
4. Nickel-chrome alloy.
5. Copper.
6. Wood and plastic.
7. Nickel.

11. What happens when ... ?

1. • Increasing the mass of a body to double “according to its density”.
• Decreasing the volume of a body to half “according to its density”.
2. Putting a piece of cork and a metallic coin in water.
3. Using water to extinguish petrol fires.
4. Heating a piece of coal.
5. An iron nail moisten by water is exposed to air for several days and why ?
6. Leaving steel bridges and the holders of light bulbs without paint.
7. Leaving some metals exposed to air for a long time and why ?

12. Choose the odd word out, then write the scientific term of the others :

1. Density – Mass – Force – Volume.
2. Petroleum – Wood – Cork – Iron.
3. Wax – Aluminium – Butter – Ice.
4. Iron – Copper – Aluminium – Wood.
5. Silver – Chromium – Potassium – Platinum.
6. Sulphur – Phosphorus – Plastic – Aluminium – Wood.
7. Acidic solutions – Sugary solutions – Salt solutions – Alkaline solutions.

13. Compare between :

1. Sugary and alkaline solutions “concerning : electric conduction”.
2. Iron and sulphur “concerning : hardness – electric conduction”.

3. Copper and plastic "concerning : electric conduction – thermal conduction".
4. Sodium and nickel "concerning : chemical activity".
5. Very active metals, less active metals and inactive metals "concerning : reaction with oxygen – examples".

14. Problems :

1. Calculate the density of iron cube, whose mass 70.2 gm and its volume 9 cm^3 .
2. The density of copper is 8.8 gm/cm^3 . Find the volume of 0.5 kg of copper.
3. If the density of alcohol is 0.8 gm/cm^3 . Find the volume of 80 gm of it.
4. Calculate the mass of a piece of sulphur, whose volume is 5 cm^3 , knowing that the density of sulphur is 2.1 gm/cm^3 .
5. When a piece of iron of mass 78 gm is put in a graduated cylinder containing 100 cm^3 of water, the reading of the cylinder becomes 110 cm^3 .

Calculate the density of iron.

6. In an experiment for determining the density of water, the following results are recorded.
 - The mass of an empty cylinder = 65 gm.
 - The mass of the cylinder and water = 165 gm.
 - The volume of water = 100 cm^3 .

Calculate the density of water.

7. In an experiment to determine the density of a kind of rocks, the following results are recorded :
 - The volume of water in the cylinder = 80 cm^3 .
 - The volume of water and the piece of rock = 100 cm^3 .
 - The mass of the piece of rock = 50 gm.

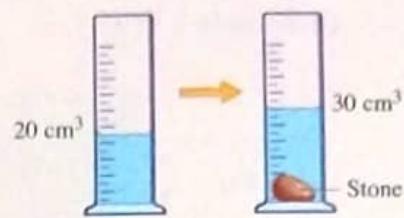
Calculate the density of the rock.

8. A piece of marble, whose mass is 100 gm is immersed in a measuring cylinder containing water, then water raised from 40 cm^3 to 60 cm^3 . What's the density of marble ?
9. When a piece of aluminium, whose mass is 27 gm is immersed in a graduated cylinder containing 100 cm^3 of water, the water level rises. **Calculate** the reading of water level after immersed this piece.
[knowing that the density of aluminium is 2.7 gm/cm^3].
10. Two balls of the same metal , the volume of the first is 10 cm^3 and that of the second is 20 cm^3 , if the mass of the first ball is 78 gm. **Calculate the mass of the second ball.**



11. From the opposite figure :

- Calculate the volume of the stone.
- If the mass of the stone = 80 gm.
What's the density of this stone ?
- If this stone is placed in a jar containing mercury.
Does it sink or float ? Give a reason.
[knowing that the density of mercury is 13.6 gm/cm³].



15. Variant questions :

- (1) Mention the formula by which you can calculate the density.
- (2) Complete the following table, then answer the given questions :

Body	Mass	Volume	Density
A	16 gm	2 cm ³(1).....
B	8 gm	4 cm ³(2).....
C	4 gm	8 cm ³(3).....
D	8 gm	16 cm ³(4).....

- Which one of these bodies has the highest density ?
- Which one of these bodies has the lowest density ?

- (3) One of your classmates has bought a medal of silver, he thought it was fake.
How can you help him to verify this thought ?
- (4) Which of the following bodies float or sink in water ? Why ?



Iron



Wood



Glass



Ice

- (5) If you know that the density of natural milk is 1.03 gm/cm³, how do you recognize the quality of milk you have bought ?
- (6) Classify the following substances according to the chemical activity.
[Chromium – Sodium – Nickel – Iron – Aluminium – Gold – Platinum – Potassium – Copper].

• (7) In the following two figures after the key is closed. In which figure does the lamp illuminate ? Why ?

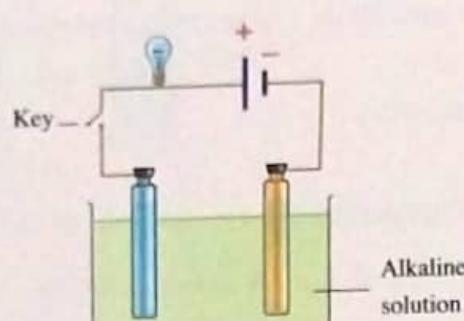


Fig. (A)

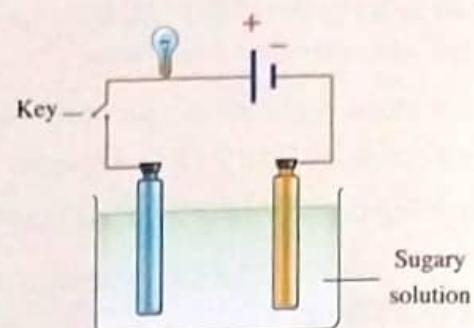


Fig. (B)

• (8) A student put some eggs in a pot filled with water and noticed that some of them floated. He deduced from the values shown in the following table that (Choose)

- rotten eggs float on water surface.
- fresh eggs float on water surface.
- rotten eggs sink in water.
- fresh eggs suspend in water.

Substance	Density (gm/cm ³)
Water	1
Rotten egg	0.9
Fresh egg	1.2

• (9) In the following figures :



(1)



(2)

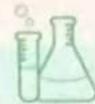


(3)

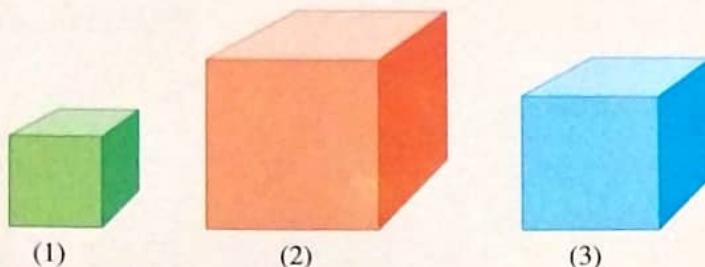


(4)

- If the balls are similar in their volumes and their masses, also the liquids are different in their densities. Arrange the liquids in an ascending order according to their densities.
- If the balls are from different materials, which are different in their densities, while the liquids are similar in their densities. Arrange the balls in an ascending order according to their densities.

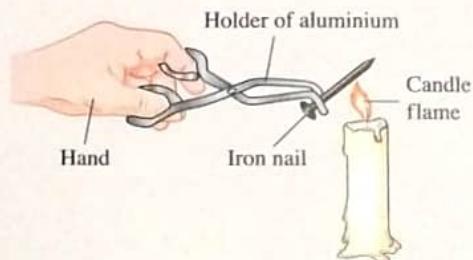


• (10) Arrange the following cubes ascendingly according to the density. Knowing that they have the same mass.



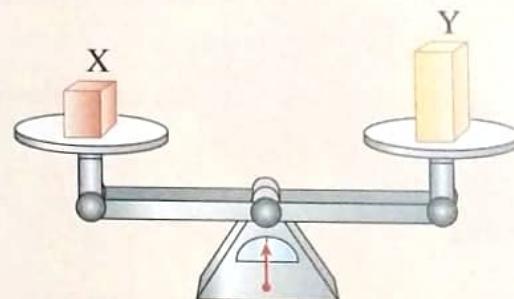
• (11) From the opposite figure, answer the following questions :

- Mention why the hand feels the heat of the flame.
- What happens when the iron nail is replaced by a piece of wax ? Why ?



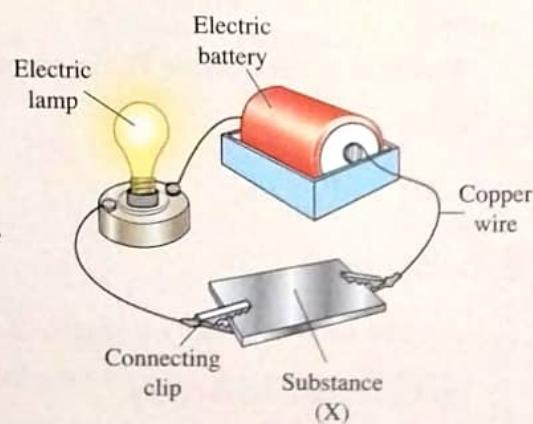
• (12) From the opposite figure, the two objects (X) and (Y) that have the same and (Choose)

- volume – density.
- mass – density.
- mass – made up of two different materials.
- volume – made up of the same material.



• (13) From the opposite figure, answer the following questions :

- What do you conclude from the illumination of the electric lamp ?
- What happens for the illumination of the lamp in the following cases. Explain why ?
 - Connect the connecting clips to the ends of a piece of wood instead of substance (X).
 - Immerse the connecting clips in dil. hydrochloric acid solution.



Thinking Skills

Questions

1. Choose the correct answer :

1. The density of 12 gm of pure iron is the density of 2 gm from it.
a. more than b. less than c. equal to d. double
2. The mass of a piece of ice before melting is its mass after melting.
a. more than b. less than c. equal to d. double
3. Two objects (A) & (B) are equal in mass, if the density of the substance of object (A) is double the density of the substance of object (B), so the ratio between the volume of object (A) to the volume of object (B) is
a. 1 : 1 b. 1 : 2 c. 2 : 1 d. 3 : 1

2. Look at the following figures, then answer :

- Figure (1) shows a plastic jar contains a metallic ball and a hollow glass ball, their mass becomes M_1
- Figure (2) shows the same plastic jar after shaking it gently for a short time, so their mass becomes M_2
- Figure (3) shows the same plastic jar after shaking it hard for a longer time, so total mass becomes M_3

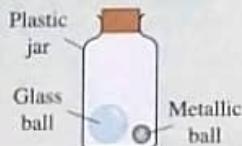


Figure (1)

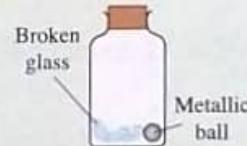


Figure (2)

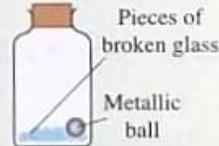


Figure (3)

Which of the following choices represents the relation between the three masses ?

- $M_1 = M_2 = M_3$
- $M_1 > M_2 > M_3$
- $M_1 < M_2 > M_3$
- $M_1 < M_2 < M_3$

3. Problem :

- A cube of wood, whose length of side is 2 cm and its mass is 6 gm.

a. Calculate its density.

b. Does this cube sink in water or float on its surface ? [Give a reason]
[Knowing that the density of water is 1 gm/cm^3].